Claims

[c1]

1. A semiconductor light source comprising:

an enclosure, said enclosure being fabricated from a transparent material through which visible light may pass, said enclosure being generally impermeable to gas,

a base to which said enclosure is mounted, said base including a fitting of appropriate shape for insertion into a light bulb socket,

an interior volume within said enclosure,

a heat sink located in said interior volume, said heat sink being capable of drawing heat from a semiconductor device mounted on said heat sink,

a plurality of semiconductor devices, at least some of said semiconductor devices being capable of emitting light having a wavelength in the range of about 200 nanometers to about 700 nanometers, at least two of said semiconductor devices being mounted on said heat sink without any module physically isolating them from each other,

a gas located within said enclosure,

an electrical connection between at least two of said semiconductor devices,

an AC/DC converter, and

an electrical connection between said AC/DC converter and said semiconductor devices.

[c2]

2. A device as recited in claim 1 further comprising:

an electrode on said base,

an electrical connection between said electrode and said AC/DC converter.

[c3]

3. A device as recited in claim 1 further comprising a luminous powder coating on the interior of said enclosure.

[c4]

4. A device as recited in claim 1 wherein at least one of said semiconductor devices is a light emitting diode.

[c5]

5. A light source comprising:

an enclosure of light transparent material,

a base of electrically conductive material,

a heat sink located within said enclosure,

a plurality of light emitting diodes mounted on said heat sink, at least some of said light emitting diodes being capable of emitting light of a wavelength in the range of from about 200 nanometers to about 700 nanometers, and said light emitting diodes being arranged on said heat sink in order to emit light in all directions other than to said base,

electrical connection among said light emitting diodes,

electrical connection of said light emitting diodes to said base.

[c6]

6. A light source as recited in claim 5 further comprising:

a vacuum within said enclosure.

[c7]

7. A light source as recited in claim 5 further comprising:

a gas within said enclosure.

[c8]

8. A light source as recited in claim 5 wherein said heat sink has a plurality of radially oriented sides and a top, each of said radially oriented sides and said top having a light emitting diode mounted on it.

[c9]

9. A light source as recited in claim 5 further comprising:

a coating on the interior of said enclosure.

[c10]

10. A light source as recited in claim 5 further comprising:

a luminous powder coating on the interior of said enclosure.

[c11]

11. A light source comprising:

a heat sink,

a plurality of wells on said heat sink,

a plurality of semiconductor devices capable of emitting light, at least one semiconductor device located in each of said wells,

an air chamber having an entrance and an exit,

a quantity of TE material located on said air chamber,

a fan located in said air chamber capable of drawing air into said entrance and forcing air out of said exit so that heat may be drawn away from said TE material and in turn drawn away from said heat sink and said semiconductor devices,

a power module for powering the light source, said power module including a fitting for installation in a traditional light bulb socket and an AC/DC converter for converting AC power from traditional building wiring to DC power usable by said semiconductor devices.

[c12]

12. A light source as recited in claim 11 wherein said semiconductor devices are selected from the group consisting of LED"s and VCSEL"s.

[c13]

13. A light source comprising:

a power module for powering the light source, said power module including a fitting for installation in a traditional light bulb socket and an AC/DC converter for converting AC power from traditional building wiring to DC power usable by a semiconductor devices,

a heat sink, said heat sink including a material selected from the group consisting of include copper, aluminum, silicon carbide, boron nitride natural diamond,

monocrystalline diamond, polycrystalline diamond, polycrystalline diamond compacts, diamond deposited through chemical vapor deposition and diamond deposited through physical vapor deposition,

a plurality of panels on said heat sink, said panels being generally planar in configuration,

a plurality of semiconductor devices capable of emitting light, at least some of said panels hosting said semiconductor devices, and

heat conductive adhesive bonding at least some of said semiconductor devices to said heat sink.

[c14]

14. A light source as recited in claim 13 further comprising an air chamber in said heat sink for dissipating heat.

[c15]

15. A light source as recited in claim 14 further comprising a fan for forcing air through said air chamber in order to dissipate heat.

[c16]

16. A light source as recited in claim 13 further comprising a quantity of TE material on said heat sink, said TE material being in electrical communication with said power module.

[c17]

17. A light source as recited in claim 13 wherein said semiconductor devices are selected from the group consisting of LED"s and VCSEL"s.

[c18]

18. A light source as recited in claim 13 wherein said semiconductor devices include a quantity of semiconductor material located on a substrate.

[c19]

19. A light source as recited in claim 18 wherein said substrates are selected from the group consisting of electrically conductive substrates and electrically insulative substrates.

[c20]

20. A light source as recited in claim 18 further comprising at least one well on said substrate, and wherein a semiconductor device capable of emitting light is located in said well.

[c21]

21. A light source as recited in claim 13 wherein at least one of said semiconductor devices is an LED array on a single semiconductor chip.

[c22]

22. A light source as recited in claim 13 wherein at least one of said semiconductor devices is a VCSEL array on a single semiconductor chip.

[c23]

23. A light source as recited in claim 13 wherein at least one of said semiconductor devices emits a single wavelength of light and further comprising a quantity of phosphor on said semiconductor device for converting single wavelength light emitted by said semiconductor device to white light useful to humans.

[c24]

24. A semiconductor light source for creating whitee light to illuminate a space used by humans, the semiconductor light source comprising:

an enclosure, said enclosure being fabricated from a material substantially transparent to white light,

a base to which said enclosure is mounted,

an interior volume within said enclosure,

a secondary heat sink located in said interior volume, said secondary heat sink being capable of drawing heat from one or more semiconductors devices mounted on it,

a surface mount LED package mounted on said secondary heat sink, said surface mount LED package including:

a primary heat sink,

a well located on said primary heat sink, said well being capable of receiving a semiconductor device therein,

an LED chip located in said well, said LED chip being capable of emitting light, and

a dome located on said primary heat sink in order to cover said well and said LED chip and to fully enclose said LED chip between said primary heat sink and said dome.

[c25]

25. A device as recited in claim 24 further comprising a phosphorous coating on the interior of said enclosure in order to convert monochromatic light emitted by said LED chip to white light.

[c26]

26. A device as recited in claim 24 further comprising a phosphorous layer covering said LED chip in order to covert monochromatic light emitted by said LED chip to white light.

[c27]

27. A device as recited in claim 24 wherein said dome is a focus dome capable of focusing light emitted by said LED chip into a substantially coherent light beam.

[c28]

28. A device as recited in claim 27 further comprising a wall in said well, said wall serving to reflect light emitted by said LED chip to said dome.

[c29]

29. A device as recited in claim 24 further comprising phosphorous coating on the interior of said dome in order to convert monochromatic light emitted by said LED chip to white light.

[c30]

30. A device as recited in claim 24 further comprising a quantity of heat conductive adhesive located between said LED chip and said primary heat sink and serving to conduct heat from said LED chip to said primary heat sink.

[c31]

31. A semiconductor light source for emitting light to illuminate a space used by humans, the semiconductor light source comprising:

an enclosure, said enclosure being fabricated from a material substantially transparent to white light,

a base to which said enclosure is mounted,

an interior volume within said enclosure,

a secondary heat sink located in said interior volume, said secondary heat sink being capable of drawing heat from one or more semiconductors devices mounted on it,

a plurality of generally planar faces located on said secondary heat sink,

a plurality of surface mount LED packages mounted on a plurality of said faces of said secondary heat sink, at least one of said LED packages including:

a primary heat sink,

a well located on said primary heat sink, said well being capable of receiving a semiconductor device therein,

an array of LED chips located in said well, said LED chips being capable of emitting light, and

a focus dome located on said primary heat sink in order to cover said well and said LED chip array and to fully enclose said LED chip array between said primary heat sink and said dome, said focus dome serving to focus light emitted by said LED array into a substantially coherent beam of light.

[c32] 32. A semiconductor light source for emitting light to illuminate a space used by humans, the semiconductor light source comprising:

an enclosure, said enclosure being fabricated from a material substantially transparent to white light,

a base to which said enclosure is mounted,

an interior volume within said enclosure,

a secondary heat sink located in said interior volume, said secondary heat sink being capable of drawing heat from one or more semiconductors devices mounted on it,

a plurality of laser diodes modules mounted on said secondary heat sink, at least one of said laser diode modules including:

a primary heat sink,

a well located on said primary heat sink, said well being capable of receiving a semiconductor device therein,

a diode laser located in said well, said diode laser being capable of emitting light, and

a cover located on said primary heat sink in order to cover said well and said diode laser and to fully enclose said diode laser between said primary heat sink and said dome.